Summary of 2015 Accomplishments for Research Vessels *Tatoosh* and *OC-2*

Photo: NOAA OCNMS

R/V *Tatoosh* is a 38ft Munson aluminum boat with jet propulsion and diesel engines, cruising speed 20 knots; shown here departing Port Angeles Boat Haven .

Photo: NOAA OCNMS

R/V *OC-2* is a 22ft Zodiac Hurricane RHIB shown here approaching the boat ramp at Quileute Marina in La Push, WA.

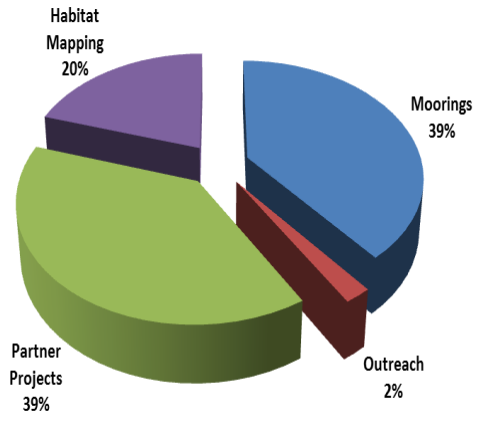
Introduction

Research vessels *Tatoosh* and *OC-2* are tasked with conducting research, observation, education and outreach missions off the rugged Washington coast in Olympic Coast National Marine Sanctuary (OCNMS). In 2015, R/V *Tatoosh* successfully completed her 21st consecutive year of service to OCNMS. After extensive maintenance over the last several years, *Tatoosh*'s re-built engines have demonstrated noticeable performance improvements. The vessel's safety equipment is also new and in excellent condition, essential for remote operations in harsh environments. R/V *OC-2* is in very good condition for its age and is utilized for nearshore monitoring, staff training, and day projects where trailering and local deployment are convenient.

Oceanographic Moorings

In 2015 OCNMS completed the 15th year of its nearshore monitoring program; deploying, maintaining, and recovering moorings at ten sites along the coast between May and October. The monitoring program measures dissolved oxygen, temperature, conductivity, turbidity, and currents. These parameters can be used to assess and model climate change, larval dispersal, hypoxia, productivity, and harmful algal blooms throughout the sanctuary.

Moorings were positioned on five transects along the 135 mile sanctuary coastline in water depths ranging from 15 to 42 meters. For the winter, a 42 meter mooring was deployed off Teahwhit Head with TidbiT temperature loggers and will be recovered when our regular TH42 mooring is deployed in the spring. The OCNMS winter mooring will serve as a complement to the winter version of UW APL 's ChaBa buoy. OCNMS winter mooring will provide a unique winter dataset for temperature throughout the water column during the winter months. OCNMS also collaborated with the Quileute Tribe's Department of Natural Resources to complete the 2015 mooring program; the tribe contributed the time of Biological Field Technician Rio Foster and Marine Biologist Jennifer Hagen to assist as vessel crew and members of the science team.



Summary

- Support area: 3,310 square miles
- Days at sea: 51
- Project hours: 344
- Approximate cost per day: $1,350
- Fuel: 4,175 gallons diesel
- Total Distance Run: over 2,100 Nautical Miles
- Education and Outreach: multiple groups, tribes, and stakeholders reached
- Research: long-term monitoring projects maintained and innovative partnerships with other research organizations formed

Vessel Acquisition

OCNMS research vessels, particularly R/V *Tatoosh*, have served the sanctuary for much longer than their forecasted service life. In the *ONMS Small Boat Requirements Study* published in 2006, R/V *Tatoosh* was scheduled for replacement in 2008 and R/V *OC-2* in 2012.

Rigorous preventative maintenance and substantial capital investments have kept the vessels operational with some interruptions to field work. R/V *Tatoosh* is nearing the end of its useful life. Unavoidable wear on the hull and power plant reduce the vessels reliability and have resulted in costly repairs and loss of operating sea days.

Replacement efforts for R/V *Tatoosh* will need to be a high priority to avoid interruption in OCNMS field operations for ongoing research and developing partnerships. A larger, more stable vessel would not only expand the potential for OCNMS operations but also make it a more viable asset for our partners.

Habitat Mapping

OCNMS began seafloor mapping from the RV *Tatoosh* in 2010, but needed to lease some components of its multibeam sonar system. In 2014, OCNMS received navigational components from NOAA's Navigational Response Branch that were installed permanently on the sanctuary's vessel. The RV *Tatoosh* equipment was then professionally surveyed for accurate placement and calibrated by NOAA Pacific Hydrographic Branch technicians. This upgrade improves the quality of sonar data produced from RV *Tatoosh* during bathymetric and habitat mapping surveys. During the 2015 field season, OCNMS field crew mapped significant portions of the areas targeted by Marine Geographer Nancy Wright and proved the viability of the vessels mapping capabilities.

Photo: NOAA OCNMS

OCNMS mooring radar reflector and surface float.

Education and Outreach

OCNMS' R/V *Tatoosh* hosted several distinguished guests this year, including volunteers from the COASST program and Olympic Coast Discovery Center, staff from Smithsonian Institution, and students of NOAA's Office of Coast Survey in support of side scan training.

Harmful Algal Bloom

The Olympic Region Harmful Algal Blooms (ORHAB) Partnership was formed in June 1999 by local residents and coastal communities in response to unpredictable closures of the shellfisheries. Closures were due to outbreaks of marine biotoxins and domoic acid contamination of razor clams and other bivalves, which can cause paralytic shellfish poisoning (PSP). It became clear that in order to manage these outbreaks there was a need to better understand underlying dynamics of these disruptive harmful algal bloom (HAB) events. Research efforts, made possible by federal funding from NOAA, have been underway since the summer of 2000. In collaboration with ORHAB and the Quileute Tribe's Department of Natural Resources, OCNMS has collected water samples in tandem with servicing OCNMS' oceanographic moorings. Quileute technicians analyze the water samples for presence and density of HAB organisms. OCNMS has also collected samples from targeted areas of concern on dedicated Northwest Fisheries Science Center (NWFSC) HAB trips in response to the HAB outbreaks along the west coast. More information is available at: http://www.orhab.org/

Photo: NOAA OCNMS

NWFSC Divers and crew of R/V *Minnow* together with OCNMS George Galasso and Liam Antrim on R/V *Tatoosh.*

Photo: NOAA OCNMS

Emergency HAB Sampling near the warm water eddy nearly 50NM northwest of La Push.

NWFSC Subtidal Research

Two teams of NOAA scientists joined forces in August 2015 to conduct subtidal dive surveys in Olympic Coast National Marine Sanctuary. Survey transects replicated work completed in decades past to evaluate changes associated with re-introduction and expansion of the sea otter population along the outer coast of Washington.

This research is a collaboration between NOAA's Olympic Coast National Marine Sanctuary and NOAA Fisheries' Northwest Fisheries Science Center, who provided staff time and expertise from their scientific dive team.

Divers returned to locations visited in 1987, 1995 and 1999 to evaluate community changes associated with growing sea otter numbers, expansion of their range and changes in availability of their food sources, or prey. Long-term monitoring is essential to understand the health of marine populations as well as changes that occur in response to predation by sea otters and other pressures on marine resources.

R/V *Tatoosh* provided dive support for this project alongside R/V *Minnow*.

Cetacean Monitoring with Acoustic Recorders

Little is known about the coastal movements of cetaceans, particularly the southern resident killer whale community, in the winter months. This data gap has been identified as a key element in better understanding the role of potential risk factors to this cetacean population. This project focuses on southern resident killer whales presence in OCNMS during winter months using bottom-anchored acoustic moorings. The project objective is to better determine the movements and occurrence of these whales and identify their important habitats.

These moorings were recovered by R/V *Tatoosh* this year in partnership with NWFSC and Oregon State University.

Success

Despite fiscal and mechanical challenges, R/V *Tatoosh* and R/V *OC-2* were successfully operated and managed by Olympic Coast National Marine Sanctuary for 51 sea days and 344 project hours in the 2015 field season. Both platforms were vital to maintaining important long-term monitoring projects with partners in addition to meeting the needs of new partners. Education and outreach opportunities supported by OCNMS vessels are unique ways to make the sanctuary accessible and provide an outdoor classroom for direct, experiential learning.

This field season was the second for Survey Technician Kathy Hough and third for vessel operator Justin Ellis with more project hours on the water than any year in recent history. With a new NOAA Corps officer, ENS Alisha Friel, coming to OCNMS in January 2016 we look forward to a busy and productive field season in 2016.

The demand for vessel use is projected to remain high in 2016 with new partnerships forming and inter-agency collaboration becoming the norm. R/V *Tatoosh* and *OC-2* continue to be important assets in OCNMS, and the sanctuary intends to continue pursuing acquisition of a larger and more capable vessel to meet the multitude of research needs on the Washington coast.

Thank you to the Quileute Tribe's Department of Natural Resources for providing valuable staff time in support of the OCNMS 2015 mooring program. Thank you to the OCNMS volunteers who have contributed their valuable time as crew members aboard R/V *Tatoosh* and R/V *OC-2*. We couldn't do it without you!

OCNMS Volunteers

Brian Marts
Julia (Lee) Clinton
Robert Rountree (Staff and volunteer!)
Robert Steelquist (Retired Staff)
Rick Fletcher (Retired Staff)